

Argon I Lines Produced in a Hollow Cathode Source, 332 nm to 5865 nm

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**W. Whaling, W. H. C. Anderson,
and M. T. Carle**

California Institute of Technology,
Pasadena CA

and

J. W. Brault and H. A. Zarem

National Solar Observatory,¹
Tucson, AZ

wnw@caltech.edu

We report precision measurements by Fourier transform spectroscopy of the vacuum wavenumber, line width, and relative signal strength of 928 lines in the Ar I spectrum. Wavelength in air and classification of the transition are supplied for each line. A comparison of our results with other precision measurements illustrates the sensitivity of Ar I wavelengths to conditions in the light source.

Key words: argon; atomic spectra; Fourier transform spectroscopy; wavelengths, pressure shifts.

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Foreword

Spectra of the noble gases are frequently observed in laboratory discharges, industrial plasmas, lighting discharges, sources for analytical spectrochemistry, and astrophysical sources. In response to the wide interest in these elements the NIST Atomic Spectroscopy Data Center is currently compiling the spectra and energy levels for all ionization stages of Ne, Ar, Kr, and Xe. A critical review of the literature revealed that no comprehensive description of the infrared spectrum of neutral argon has ever been published.

In 1995 observations of the spectrum of singly ionized argon covering the range 222 nm to 5865 nm were published by Whaling, Anderson, Carle, Brault, and

Zarem [J. Quant. Spectros. Radiat. Transfer **53**, 1 (1995)]. Their measurements, made with the high-resolution Fourier Transform Spectrometer at the National Solar Observatory (Kitt Peak), have been widely used as a source of wavelength standards. Measurements of neutral argon from the same spectra have been circulated as an unpublished line list. This list has been used in a number of laboratories to identify lines of argon in spectral sources and as a source of calibration wavelengths.

This article presents the comprehensive list of neutral argon observations from the Kitt Peak spectra over a wide wavelength region from the near ultraviolet to near infrared and describes the experimental conditions under which the measurements were made. It was prepared by Ward Whaling for publication in the NIST Journal of Research with the encouragement and assistance of the Atomic Spectroscopy Data Center in order

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to make these data available to the broad community of users and to adequately document the work so that its results can be integrated with other available data in our argon compilation.

Craig J. Sansonetti

NIST Atomic Spectroscopy Data Center

1. Introduction

Argon is frequently used to sustain the discharge in a hollow cathode spectral source, and the source typically excites the first, second, and third spectra of argon as well as the spectrum of the cathode material. Consequently, a complete picture of the argon spectrum is useful in avoiding, or correcting for, interference between argon lines and lines from the cathode material. In this paper we provide such a line list for Ar I; similar line lists for Ar II [1] and Ar III [2] have been published earlier.

2. Experimental Method

Argon lines were obtained by comparing many high-resolution spectra of a hollow cathode discharge in argon, with *different* cathode materials for the different spectra. By extracting lines common to several spectra, regardless of the cathode material, we have generated a list of lines arising from the argon that supports the discharge, or from a common contaminant as discussed below.

All spectra were recorded on the 1 m vacuum Fourier transform spectrometer [3] at the National Solar Observatory (Kitt Peak). Hollow cathode spectra from the Kitt Peak archive with cathodes of Co, Cu, Fe, Mo, Ti, V, and Y were measured for this work; the Kitt Peak National Observatory archive designation of each spectrum is given in Ref. [1]. The cathode cavity was 25 mm long by 8 mm diameter; further details of the water-cooled source will be found in Ref. [1]. The source pressure varied from one spectrum to another between 270 Pa and 530 Pa (2 Torr and 4 Torr) of high purity argon, with discharge currents between 150 mA and 600 mA.

All spectra were measured with the DECOMP [4] line-finding program developed by Brault. This program fits a Voigt profile to the spectral feature and records the line-center, peak amplitude, full width at half maximum intensity (FWHM), and other parameters of the Voigt profile.

3. Results

In the first column of Table 1 we list the line-center vacuum wavenumber (in cm^{-1}), followed by the experimental uncertainty in column 2. The ratio of the peak amplitude S to the root mean square background noise N appears in column 3 as the $\log_{10}(S/N)$ for each line. Note that the peak amplitude has not been corrected for the spectrometer response. Over the range of a given spectrum, the spectrometer response may vary by an order of magnitude, and the comparison of the signal-to-noise ratio of two lines is a reliable indication of the relative strength of the lines only if they are close in wavelength. The full width of the observed line (in 10^{-3} cm^{-1}) at half maximum height appears in the 4th column. The absolute value of the line width depends on source and instrumental conditions, but the increased relative width of lines from levels of high excitation and high angular momentum is an aid in identification.

The uncertainty $\Delta\sigma$ in the line-center wavenumber appears in the second column. This experimental uncertainty (one standard deviation level) comes from two sources: (1) the uncertainty $\Delta\sigma_L$ in locating the center of the line in the presence of noise, and (2) $\Delta\sigma_S$ from the uncertainty in the scale of the FTS. We combine these to find the overall uncertainty in the wave number: $\Delta\sigma = [(\Delta\sigma_L)^2 + (\Delta\sigma_S)^2]^{1/2}$.

(1) We evaluate the uncertainty in locating the line center from $\Delta\sigma_L = 0.5(W)/(S/N)$, where W (the FWHM) and S/N (the signal-to-noise ratio) appear in Table 1, and the factor 0.5 is an approximation to the more precise factor given by Davis, Abrams, and Brault [5]. For very strong lines ($S/N > 10^4$) this expression may underestimate $\Delta\sigma_L$ because it neglects self-absorption that may, if asymmetric, shift the line center, and it neglects the local increase in the noise level under a strong line in the FTS spectrum [6]. We therefore set a lower limit on $\Delta\sigma_L$ of 0.0003 cm^{-1} . The argument supporting this limiting value is presented in Ref. [1].

(2) Wavenumbers measured with the FTS must be multiplied by a scale factor s to correct for any angular deviation between the path followed by light from the source as it passes through the instrument and the path followed by the laser beam that measures the displacement of the FTS mirror. The scale factor s is a constant (~ 1) for a given spectrum and is determined empirically by measuring with the FTS standard lines of accurately known wavenumber; $s = (\text{standard wavenumber})/(\text{measured wavenumber})$. Any uncertainty Δs in the determination of s contributes a proportional uncertainty in the corrected wavenumber σ given by $\Delta\sigma_S = \sigma(\Delta s/s)$. The factor in parentheses was typically $(3 \text{ to } 7) \times 10^{-8}$ for the different spectra that we measured. We adopt as the

uncertainty Δs for a particular spectrum the standard deviation in the mean value of s derived from measurements of 28 Ar II standard lines in that spectrum.

As standards we used as many as possible of the 28 Ar II lines recommended by Learner and Thorne [7]. These well isolated lines of good strength from transitions between low excitation levels should be minimally sensitive to pressure in the source. Our wavenumbers for these Ar II standard lines were taken from Ref. [1] and derive ultimately from the CO molecular lines used to calibrate the Ar II spectra [8]. Our Ar II wavenumbers are slightly higher than the values reported by Norlén [9]. For the 28 Ar II standard lines, the mean value of the ratio σ (based on CO)/ σ (Norlén) is $[1 + 67(8) \times 10^{-9}]$.

The list of argon wavenumbers collected by comparing different spectra was then compared with line lists in the literature for Ar I, Ar II, and Ar III—notably those of Minnhagen [10], Striganov and Sventitskii [11], and Kurucz and Peytremann [12]—to identify the ion and classify the transition. Additional Ar I lines with wavelengths longer than those in existing compilations were identified by calculating all electric dipole transition energies allowed by parity and J -value selection rules, using Ar I level energies from Moore [13] as expanded and refined by level energies from Minnhagen [10] and Norlén [9]. In Table 1, we identify the transition upper level in columns 5–7 by its energy, J -value, and orbital, and the lower level in columns 8–10. When individual J levels could not be resolved, the [K] value (the result of coupling the total angular momentum J_1 of the $3p^5$ core with the orbital angular momentum l of the valence electron) is given. The last column gives the wavelength in air as determined from the vacuum wavenumber by a formula from Edlén [14].

Ar II and Ar III lines were identified and classified in the same way. When all Ar I, II, and III lines had been removed from the list of common lines, we searched for possible contaminants that might be common to all our spectra by searching for the strongest lines in the spectra of H, He, C, N, O, Ne, Na, and Fe. A few H, C, and O lines were found, readily identified as coming from a low-mass contaminant by their broad Doppler widths. On the Cu cathode spectrum between 2000 cm^{-1} and 3000 cm^{-1} , molecular lines from ArH^+ were abundant and strong (S/N up to 10^2).

With all known Ar and contaminant lines removed, the 114 common lines left over are presumably from Ar. By comparing the relative intensity of these unidentified lines in spectra recorded at different power levels, we conclude that most come from an Ar ion. Four unidentified lines that appear to come from Ar I are included in Table 1 with no designation.

4. Comparison With Other Line Lists

Our Ar I wavelengths agree with those of Minnhagen [10] within the modest precision he assigns: “better than 10 mÅ for lines that are not too weak.” Our agreement with Norlén’s [9] wavenumbers is generally within $(1\text{ or }2) \times 10^{-3}\text{ cm}^{-1}$, as might be expected from the close agreement of his calculated wavenumbers for Ar II with the values we used to calibrate the FTS scale. Norlén’s calculated wavenumbers are essentially averages over many alternate (Ritz-equivalent) paths that reduce the uncertainty of his values well below that which we are able to achieve in a single measurement, especially for weak lines. Hence Norlén’s values, multiplied by $[1 + 67(8) \times 10^{-9}]$, are to be preferred to those in Table 1 when available.

Palmeri and Biemont [15] have measured 100 transitions from $4f$, $5g$, and $6g$ levels in Ar I, using spectra recorded with the same FTS used in the present experiment. In their hollow cathode source they used various Ar pressures but all were lower than ours; their average pressure of about 130 Pa (1 Torr) was lower than ours by a factor of $1/3$. For the $4f \rightarrow 3d$ transitions (66 lines), our wavenumbers agree beautifully with theirs; the mean deviation between the two sets of wavenumbers is $0.4(1.1) \times 10^{-3}\text{ cm}^{-1}$. For the $5g \rightarrow 4f$ and $6g \rightarrow 4f$ transitions (33 lines), our wavenumbers are, on average, greater than theirs by $6 \times 10^{-3}\text{ cm}^{-1}$. We attribute this difference to a pressure effect that appears to be strongly dependent on the angular momentum of the levels involved. This difference did not show up in our comparison with Norlén’s wavenumbers, even though his source pressure was lower than ours by a factor of $1/10$, because the shift depends on the angular momentum of the levels involved and Norlén measured only transitions between s , p , and d orbitals in Ar I.

Any interaction between an excited Ar atom and neighboring atoms that shifts the energy of an excited level will also broaden it, and this effect is clearly seen in Table 1. For example, transitions near 3800 cm^{-1} from the $6g$ levels in Ar I have an average width $\approx 300 \times 10^{-3}\text{ cm}^{-1}$, while nearby lines from $4d'$ and $5p'$ upper levels have widths between $(18\text{ and }22) \times 10^{-3}\text{ cm}^{-1}$. The dependence on l appears to be greater than the dependence on n ; nine lines from $7p$ configurations in the same ($3600\text{ to }4000\text{ cm}^{-1}$) range have an average width of $38 \times 10^{-3}\text{ cm}^{-1}$. In these examples, the lines are only broadened and shifted at the pressure (270 Pa to 530 Pa) of our source, but the lines may not be seen at all from a source at higher pressure. Palmeri and Biemont [15] report lines near 2100 cm^{-1} from $7g$ and $7h$ levels of Ar I that are broadened beyond recognition as lines on our spectra.

We conclude that the gas pressure in our hollow cathode source has *increased* the wavenumber of some lines from levels of high l or n . The shifted lines display a width noticeably greater than that of nearby transitions

between s , p , and d levels. The wavenumbers, line widths, and relative signal amplitudes in the table are those one can expect to see from a hollow cathode discharge in Ar at a pressure of a few hundred Pa.

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification

Wavenumber (cm^{-1})	Unc. (cm^{-1})	$\log(S/N)$	FWHM (10^{-3} cm^{-1})	Upper level ^a		Lower level ^a		Wavelength (nm)
1704.5679	.0008	1.10	21	121271	2	6p	119566	5864.9902
1710.0644	.0005	1.23	18	121470	0	6p	119760	5846.1389
1723.0187	.0003	2.23	15	118907	2	4d	117184	5802.1855
1746.9721	.0004	1.36	17	121192	2	6p	119445	5722.6295
1755.2831	.0003	1.71	15	118907	2	4d	117151	5695.5337
1778.6263	.0003	1.45	19	122791	0	6p'	121012	5620.7838
1786.1520	.0016	0.84	22	122036	4	5d	120250	5597.1015
1798.3588	.0003	1.77	14	116660	1	5p	114862	5559.1098
1806.8168	.0005	1.30	19	121655	2	4f'	119848	5533.0867
1812.3256	.0003	2.26	19	121257	1	6p	119445	5516.2681
1816.7271	.0005	1.18	15	117184	2	5p	115367	5502.9035
1825.7821	.0008	1.15	23	121271	2	6p	119445	5475.6118
1828.9313	.0003	2.15	21	122036	4	5d	120207	5466.1834
1850.9071	.0050	0.48	30	123505	2	5d'	121655	5401.2835
1852.2026	.0003	3.53	16	118512	0	4d	116660	5397.5056
1853.5579	.0046	1.00	91	124136	3	5f'	122282	5393.5590
1854.8601	.0003	2.15	15	116660	1	5p	114805	5389.7725
1856.8485	.0008	1.11	20	122087	2	5d	120230	5384.0008
1857.1584	.0003	2.50	21	122087	2	5d	120230	5383.1024
1881.5954	.0003	2.98	18	122635	2	6p'	120753	5313.1900
1898.2640	.0003	1.71	22	122087	2	5d	120189	5266.5350
1898.6772	.0011	0.95	20	122087	2	5d	120188	5265.3889
1903.1812	.0054	0.50	34	123557	3	5d'	121654	5252.9280
1904.1373	.0003	1.94	26	123557	3	5d'	121653	5250.2904
1907.2839	.0003	2.36	15	118907	2	4d	116999	5241.6286
1910.2258	.0003	1.45	17	122160	3	5d	120250	5233.5561
1910.2660	.0005	1.61	41	122160	3	5d	120250	5233.4459
1930.0838	.0095	0.47	56	122160	3	5d	120230	5179.7098
1930.3927	.0020	0.84	27	122160	3	5d	120230	5178.8810
1942.2126	.0014	1.43	73	122696	4	5f	120753	5147.3634
1952.4926	.0003	2.51	19	121165	3	6p	119213	5120.2621
1952.9706	.0003	2.48	23	122160	3	5d	120207	5119.0089
1963.8546	.0003	1.77	16	118907	2	4d	116943	5090.6386
1964.3675	.0030	1.30	121	122718	3	5f	120753	5089.3094
1971.1566	.0020	0.52	13	121654	3	4f'	119683	5071.7807
1975.5468	.0043	0.95	76	124136	4	5f'	122160	5060.5098
1978.9326	.0003	3.25	18	121192	2	6p	119213	5051.8517
1990.6309	.0003	2.49	20	122610	1	6p'	120619	5022.1635
1991.3992	.0003	3.61	15	118651	1	4d	116660	5020.2259
2000.3339	.0003	1.57	21	122601	1	6p'	120601	4997.8026
2007.1430	.0011	0.70	11	124715	3	7d	122708	4980.8478
2010.6171	.0035	0.67	33	123172	1	7p	121161	4972.2416
2024.3074	.0003	1.75	15	116999	2	5p	114975	4938.6145
2029.2808	.0003	2.47	16	119213	3	4d	117184	4926.5108
2032.2207	.0003	2.20	26	122282	2	5d	120250	4919.3839
2034.1767	.0003	2.20	19	122635	2	6p'	120601	4914.6536
2050.2908	.0012	1.52	78	124137	3	5f'	122087	4876.0273

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm ⁻¹)	Unc. (cm ⁻¹)	log (S/N)	FWHM (10 ⁻³ cm ⁻¹)	Upper level ^a (cm ⁻¹)		Lower level ^a (cm ⁻¹)		Wavelength (nm)
2052.0339	.0004	1.50	26	122282	2 5d	120230	2 4f	4871.8853
2057.7439	.0003	1.49	21	121271	2 6p	119213	3 4d	4858.3664
2067.0419	.0054	0.66	49	122686	1 5f	120619	2 4d'	4836.5124
2067.3880	.0023	1.09	56	122686	2 5f	120619	2 4d'	4835.7027
2075.0395	.0004	1.13	11	125330	2 10s	123255	1 7p	4817.8716
2075.3327	.0029	0.67	27	123172	1 7p	121097	0 6s'	4817.1909
2079.7502	.0003	2.24	28	122330	3 5d	120250	4 4f	4806.9589
2080.8897	.0003	4.77	16	119024	4 4d	116943	3 5p	4804.3266
2085.5130	.0011	1.45	61	122686	2 5f	120601	2 4d'	4793.6761
2087.2321	.0003	1.73	18	121653	4 4f'	119566	3 4d	4789.7279
2088.1848	.0004	1.34	18	121654	3 4f'	119566	3 4d	4787.5427
2088.8664	.0012	1.56	86	122708	3 5f	120619	2 4d'	4785.9805
2089.1113	.0024	1.19	73	122708	2 5f	120619	2 4d'	4785.4194
2098.7920	.0051	1.21	164	122718	3 5f	120619	2 4d	4763.3466
2099.9107	.0004	1.53	28	122330	3 5d	120230	3 4f	4760.8090
2102.3065	.0003	1.71	31	123373	2 5d'	121271	2 6p	4755.3836
2106.9917	.0005	1.86	78	122708	3 5f	120601	2 4d'	4744.8093
2115.7642	.0024	0.78	29	123373	2 5d'	121257	1 6p	4725.1361
2120.5669	.0007	1.24	25	123774	3 6d	121653	4 4f'	4714.4345
2120.8171	.0003	3.14	15	116943	3 5p	114822	3 3d'	4713.8783
2122.4890	.0007	1.38	32	122330	3 5d	120207	4 4f	4710.1652
2131.8359	.0003	3.34	17	120601	2 4d'	118469	2 5p'	4689.5137
2140.9990	.0003	3.56	19	121012	1 4d'	118871	0 5p'	4669.4434
2141.2904	.0003	3.84	17	120601	2 4d'	118460	1 5p'	4668.8080
2141.7196	.0003	3.68	19	121165	3 6p	119024	4 4d	4667.8724
2149.9613	.0003	2.00	16	120619	2 4d'	118469	2 5p'	4649.9785
2153.0756	.0133	0.97	249	124871	4 7g	122718	4 5f	4643.2525
2154.2720	.0033	0.84	45	123809	2 6d	121654	3 4f'	4640.6738
2155.2844	.0005	1.16	15	123809	2 6d	121653	3 4f'	4638.4940
2159.4158	.0003	3.60	17	120619	2 4d'	118460	1 5p'	4629.6196
2160.9803	.0029	0.93	49	123816	1 5d'	121655	2 4f'	4626.2679
2162.1254	.0003	2.66	20	121069	1 6p	118907	2 4d	4623.8177
2171.5873	.0188	0.93	320	124867	5 7g	122696	5 5f	4603.6711
2176.3085	.0003	2.14	15	117151	1 5p	114975	1 5s'	4593.6841
2177.3877	.0003	2.82	15	116999	2 5p	114822	3 3d'	4591.4073
2193.4579	.0003	3.57	17	120601	2 4d'	118407	1 5p'	4557.7687
2194.1919	.0003	2.63	15	116999	2 5p	114805	2 3d'	4556.2440
2196.0919	.0003	1.84	16	117563	0 5p	115367	1 3d'	4552.3021
2196.7152	.0008	0.99	16	124357	2 8p	122160	3 5d	4551.0104
2197.2121	.0003	3.70	17	119760	1 6s	117563	0 5p	4549.9812
2204.5860	.0015	1.37	71	124137	2 5f'	121933	1 5d	4534.7624
2208.4057	.0003	2.65	18	121653	3 4f'	119445	2 4d	4526.9190
2208.5727	.0003	3.14	15	117184	2 5p	114975	1 5s'	4526.5767
2209.3987	.0005	1.25	18	121654	3 4f'	119445	2 4d	4524.8844
2209.7454	.0003	1.57	19	121655	2 4f'	119445	2 4d	4524.1744
2211.5834	.0003	4.03	17	120619	2 4d'	118407	1 5p'	4520.4145
2213.5460	.0003	4.46	16	119213	3 4d	116999	2 5p	4516.4065
2246.6156	.0003	3.99	16	118907	2 4d	116660	1 5p	4449.9264
2248.3218	.0011	0.95	19	123505	2 5d'	121257	1 6p	4446.5494
2251.7588	.0044	0.56	32	123509	0 6d	121257	1 6p	4439.7624
2258.7548	.0005	1.27	18	121165	3 6p	118907	2 4d	4426.0112
2261.2421	.0003	2.98	17	119445	2 4d	117184	2 5p	4421.1427
2270.1168	.0003	3.75	16	119213	3 4d	116943	3 5p	4403.8589
2284.4171	.0003	4.27	17	120753	3 4d'	118469	2 5p'	4376.2910

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Wavenumber (cm ⁻¹)	Unc. (cm ⁻¹)	log (S/N)	FWHM (10 ⁻³ cm ⁻¹)	Upper level ^a (cm ⁻¹)		Lower level ^b (cm ⁻¹)			Wavelength (nm)	
2284.8056	.0003	3.97	19	119848	1	4d	117563	0	5p	4375.5469
2285.1957	.0003	2.02	20	121192	2	6p	118907	2	4d	4374.7999
2289.6911	.0003	2.36	15	117151	1	5p	114862	0	5s'	4366.2108
2290.3931	.0003	2.40	17	121161	1	6s'	118871	0	5p'	4364.8726
2293.5068	.0003	4.18	17	119445	2	4d	117151	1	5p	4358.9467
2301.7641	.0003	1.98	16	116943	3	5p	114641	2	3d'	4343.3095
2312.9381	.0035	1.12	93	124349	3	8p	122036	4	5d	4322.3266
2313.6761	.0014	0.90	22	123505	2	5d'	121192	2	6p	4320.9479
2325.5328	.0009	1.32	38	122514	1	5d	120189	2	4f	4298.9176
2346.1926	.0003	2.48	16	117151	1	5p	114805	2	3d'	4261.0628
2350.5497	.0003	2.29	19	121257	1	6p	118907	2	4d	4253.1642
2358.3348	.0003	3.05	15	116999	2	5p	114641	2	3d'	4239.1241
2361.6531	.0003	2.94	16	117184	2	5p	114822	3	3d'	4233.1678
2364.0065	.0003	3.30	19	121271	2	6p	118907	2	4d	4228.9536
2365.6102	.0008	1.17	24	123557	3	5d'	121192	2	6p	4226.0867
2378.4572	.0003	3.68	16	117184	2	5p	114805	2	3d'	4203.2599
2382.4561	.0003	4.39	17	119566	3	4d	117184	2	5p	4196.2049
2392.0485	.0018	0.85	25	123557	3	5d'	121165	3	6p	4179.3776
2399.2345	.0008	1.33	33	123468	1	6d	121069	1	6p	4166.8598
2417.3418	.0003	2.91	20	121069	1	6p	118651	1	4d	4135.6476
2440.1867	.0015	1.02	31	123509	0	6d	121069	1	6p	4096.9299
2440.4078	.0003	2.96	18	121653	4	4f ^r	119213	3	4d	4096.5587
2441.3600	.0003	1.60	17	121654	3	4f ^r	119213	3	4d	4094.9609
2441.7057	.0018	0.71	18	121655	2	4f ^r	119213	3	4d	4094.3811
2445.5073	.0003	3.97	17	119445	2	4d	116999	2	5p	4088.0163
2459.5585	.0038	0.96	69	122709	[2.5]	5g	120250	4	4f	4064.6619 B
2459.5811	.0103	0.76	119	122709	[2.5]	5g	120250	3	4f	4064.6246 B
2465.6143	.0063	0.48	38	123936	1	8s	121470	0	6p	4054.6787
2469.5656	.0003	2.37	66	122719	[3.5]	5g	120250	4	4f	4048.1912 B
2469.5987	.0003	2.43	100	122719	[3.5]	5g	120250	3	4f	4048.1370 B
2473.0739	.0003	3.07	44	122723	[4.5]	5g	120250	4	4f	4042.4484 B
2473.1102	.0003	3.47	87	122723	4	5g	120250	3	4f	4042.3891
2479.4116	.0003	2.18	29	122709	[2.5]	5g	120230	2	4f	4032.1154
2479.7056	.0003	2.48	57	122709	[2.5]	5g	120230	3	4f	4031.6374 B
2487.7965	.0012	1.14	34	123653	4	6d	121165	3	6p	4018.5255
2489.4120	.0003	3.18	65	122719	3	5g	120230	2	4f	4015.9177
2489.7220	.0003	3.32	67	122719	[3.5]	5g	120230	3	4f	4015.4177 B
2493.9253	.0003	2.86	57	124149	3	5g	121655	2	4f	4008.6500
2494.2737	.0003	3.00	57	124148	[3.5]	5g	121654	3	4f	4008.0901 B
2495.0047	.0003	3.25	88	124148	[3.5]	5g	121653	3	4f	4006.9158 B
2495.2332	.0013	1.61	102	124148	[3.5]	5g	121653	4	4f	4006.5489 B
2499.4868	.0003	3.75	17	119683	2	6s	117184	2	5p	3999.7305
2502.0780	.0003	2.74	17	119445	2	4d	116943	3	5p	3995.5883
2505.6623	.0003	3.48	39	122713	[5.5]	5g	120207	4	4f	3989.8727 B
2505.7057	.0003	3.69	58	122713	[5.5]	5g	120207	5	4f	3989.8036 B
2510.3355	.0003	3.36	16	117151	1	5p	114641	2	3d'	3982.4453
2512.2643	.0003	1.76	18	116660	1	5p	114148	1	3d	3979.3877
2512.3413	.0048	0.98	92	122719	[3.5]	5g	120207	[4.5]	4f	3979.2658 B
2515.8301	.0003	2.19	78	122723	[4.5]	5g	120207	4	4f	3973.7475 B
2515.8629	.0003	2.26	109	122723	[4.5]	5g	120207	5	4f	3973.6957 B
2520.8112	.0003	3.31	56	122709	[2.5]	5g	120189	2	4f	3965.8955 B
2521.2210	.0003	3.08	60	122709	2	5g	120188	1	4f	3965.2508
2531.7513	.0003	2.90	17	119683	2	6s	117151	1	5p	3948.7582
2542.8637	.0003	3.20	19	121012	1	4d'	118469	2	5p'	3931.5020

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
2552.3181	.0003	2.94	19	121012	1	4d'	118460	3916.9387
2556.5390	.0003	2.56	21	121069	1	6p	118512	3910.4718
2566.7213	.0003	3.55	17	119566	3	4d	116999	3894.9588
2571.0392	.0136	0.44	75	123172	1	7p	120601	3888.4174
2576.5772	.0003	3.43	17	119760	1	6s	117184	3880.0598
2587.9374	.0003	1.73	16	117563	0	5p	114975	3863.0276
2604.4858	.0003	2.76	19	121012	1	4d'	118407	3838.4827
2605.7661	.0003	2.19	20	121257	1	6p	118651	3836.5967
2608.8419	.0003	3.80	17	119760	1	6s	117151	3832.0734
2619.2228	.0003	2.42	20	121271	2	6p	118651	3816.8855
2623.2920	.0003	3.86	18	119566	3	4d	116943	3810.9648
2625.0351	.0014	1.00	28	123882	1	7s'	121257	3808.4342
2632.5850	.0017	1.16	48	123903	2	8s	121271	3797.5122
2637.0050	.0003	3.18	19	121097	0	6s'	118460	3791.1470
2664.1706	.0003	2.52	19	119848	1	4d	117184	3752.4900
2665.2399	.0030	0.90	48	123936	1	8s	121271	3750.9845
2678.6952	.0021	1.12	55	123936	1	8s	121257	3732.1430
2683.7523	.0003	3.44	18	119683	2	6s	116999	3725.1104
2689.1726	.0003	3.27	18	121097	0	6s'	118407	3717.6021
2690.3873	.0012	1.02	26	123882	1	7s'	121192	3715.9236
2692.2580	.0003	3.86	18	121161	1	6s'	118469	3713.3416
2696.4354	.0003	4.11	19	119848	1	4d	117151	3707.5888
2701.7123	.0003	3.65	18	121161	1	6s'	118460	3700.3473
2711.4036	.0003	1.98	15	123903	2	8s	121192	3687.1212 B
2725.0243	.0067	0.65	60	125335	0	8s'	122610	3668.6916
2737.8368	.0006	1.59	44	123903	2	8s	121165	3651.5229
2740.3226	.0003	4.28	18	119683	2	6s	116943	3648.2105
2744.0525	.0009	1.37	40	123936	1	8s	121192	3643.2516
2744.9632	.0003	1.72	21	121257	1	6p	118512	3642.0429
2747.6223	.0003	3.57	18	121654	3	4f'	118907	3638.5182
2747.9691	.0003	2.44	18	121655	2	4f'	118907	3638.0590
2753.4613	.0026	0.70	26	122601	1	6p'	119848	3630.8023
2753.8798	.0003	3.82	18	121161	1	6s'	118407	3630.2505
2760.8424	.0003	4.08	18	119760	1	6s	116999	3621.0954
2784.8409	.0012	0.85	17	119445	2	4d	116660	3589.8904
2813.4539	.0039	0.60	31	123882	1	7s'	121069	3553.3810
2818.8415	.0003	2.03	20	121470	0	6p	118651	3546.5895
2834.4679	.0017	1.19	54	123903	2	8s	121069	3527.0371
2838.2967	.0023	1.25	83	122686	1	5f	119848	3522.2792
2838.6384	.0003	2.52	58	122686	2	5f	119848	3521.8552
2848.4359	.0003	2.15	20	119848	1	4d	116999	3509.7414
2851.5955	.0003	2.28	17	116999	2	5p	114148	3505.8526
2860.3627	.0003	2.43	81	122708	2	5f	119848	3495.1069
2874.8957	.0039	0.64	34	122635	2	6p'	119760	3477.4387
2918.1446	.0007	1.17	21	122601	1	6p'	119683	3425.9006
2926.5652	.0036	0.69	35	122610	1	6p'	119683	3416.0433
2942.7840	.0072	0.59	56	122791	0	6p'	119848	3397.2162
2947.9582	.0023	1.30	90	122708	2	5f	119760	3391.2534
2976.1176	.0023	1.23	78	124137	2	5f'	121161	3359.1661
3003.1852	.0003	2.94	19	121655	2	4f'	118651	3328.8900
3003.5961	.0003	4.16	17	117151	1	5p	114148	3328.4346
3016.7344	.0003	4.10	16	116660	1	5p	113643	3313.9388
3023.0838	.0003	3.94	18	119683	2	6s	116660	3306.9785
3024.8017	.0022	1.32	90	122708	3	5f	119683	3305.1004

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Wavenumber (cm ⁻¹)	Unc. (cm ⁻¹)	log (S/N)	FWHM (10 ⁻³ cm ⁻¹)	Upper level ^a (cm ⁻¹)		Lower level ^a (cm ⁻¹)			Wavelength (nm)
3035.8606	.0003	2.43	17	117184	2	5p	114148	1 3d	3293.0607
3040.5660	.0003	3.57	18	118407	1	5p'	115367	1 3d'	3287.9646
3061.9268	.0003	2.51	21	121933	1	5d	118871	0 5p'	3265.0269
3069.0179	.0011	1.04	25	122635	2	6p'	119566	3 4d	3257.4829
3092.7336	.0003	3.57	18	118460	1	5p'	115367	1 3d'	3232.5038
3095.4093	.0003	3.01	15	111818	1	3d	108723	0 4p'	3229.7096
3100.1742	.0003	3.25	18	119760	1	6s	116660	1 5p	3224.7456
3102.1880	.0003	2.81	18	118469	2	5p'	115367	1 3d'	3222.6523
3120.3530	.0033	1.00	65	122686	2	5f	119566	3 4d	3203.8917
3125.5136	.0004	1.96	74	124137	2	5f'	121012	1 4d'	3198.6017
3129.6340	.0003	2.05	61	122696	4	5f	119566	3 4d	3194.3905
3141.8337	.0004	2.03	75	122708	3	5f	119566	3 4d	3181.9867
3143.1718	.0013	1.08	32	123373	2	5d'	120230	3 4f	3180.6321
3151.7997	.0003	2.60	92	122718	4	5f	119566	3 4d	3171.9253
3164.8110	.0006	1.25	22	122610	1	6p'	119445	2 4d	3158.8847
3187.7678	.0003	2.01	20	119848	1	4d	116660	1 5p	3136.1359
3191.5209	.0003	4.70	17	116660	1	5p	113468	2 5s	3132.4479
3226.2014	.0003	3.64	17	116943	3	5p	113717	3 3d	3098.7752
3234.0312	.0003	2.09	24	116660	1	5p	113426	2 3d	3091.2729 B
3255.6064	.0111	0.43	60	123505	2	5d'	120250	3 4f	3070.7867
3263.2924	.0006	1.81	78	122708	2	5f	119445	2 4d	3063.5541
3272.9837	.0003	2.40	91	122718	3	5f	119445	2 4d	3054.4830
3279.3267	.0039	0.90	62	123468	1	6d	120189	2 4f	3048.5749
3279.7342	.0042	0.70	42	123468	1	6d	120188	1 4f	3048.1961
3282.7720	.0003	3.49	17	116999	2	5p	113717	3 3d	3045.3753
3320.6895	.0044	0.71	45	123509	0	6d	120188	1 4f	3010.6015
3334.4971	.0003	1.91	21	121794	0	5d	118460	1 5p'	2998.1351
3350.2442	.0019	0.94	33	123557	3	5d'	120207	4 4f	2984.0430
3356.0661	.0003	4.96	17	116999	2	5p	113643	1 5s	2978.8665
3382.2227	.0003	2.34	68	124136	4	5f'	120753	3 4d'	2955.8292
3383.7324	.0044	0.95	78	124137	3	5f'	120753	3 4d'	2954.5105
3386.6647	.0009	1.09	23	121794	0	5d	118407	1 5p'	2951.9523
3403.2640	.0077	0.53	52	123653	4	6d	120250	4 4f	2937.5543
3407.1346	.0013	1.13	35	123255	1	7p	119848	1 4d	2934.2171
3415.2255	.0003	3.77	18	117563	0	5p	114148	1 3d	2927.2658
3417.2967	.0003	3.43	19	120601	2	4d'	117184	2 5p	2925.4916
3422.1922	.0006	1.31	22	122635	2	6p'	119213	3 4d	2921.3066
3432.4115	.0003	4.12	17	118407	1	5p'	114975	1 5s'	2912.6090
3435.4222	.0003	3.18	19	120619	2	4d'	117184	2 5p	2910.0565
3444.4688	.0107	0.60	85	124610	4	7d	121165	3 6p	2902.4135
3446.0344	.0004	1.67	36	123653	4	6d	120207	5 4f	2901.0949
3448.9604	.0009	1.07	22	121012	1	4d'	117563	0 5p	2898.6337
3449.5614	.0003	2.95	19	120601	2	4d'	117151	1 5p	2898.1286
3460.5026	.0006	1.39	31	123221	2	7p	119760	1 6s	2888.9655
3463.7917	.0003	2.11	22	121933	1	5d	118469	2 5p'	2886.2222
3467.0373	.0003	4.35	18	117184	2	5p	113717	3 3d	2883.5204
3467.6864	.0003	1.57	20	120619	2	4d'	117151	1 5p	2882.9806
3474.2819	.0064	0.12	17	116943	3	5p	113468	2 5s	2877.5076
3482.0739	.0031	1.00	62	124643	1	7p'	121161	1 6s'	2871.0685
3482.8101	.0003	2.74	60	122696	4	5f	119213	3 4d	2870.4616
3484.5791	.0003	4.10	18	118460	1	5p'	114975	1 5s'	2869.0044
3488.8505	.0008	1.36	35	123172	1	7p	119683	2 6s	2865.4918
3494.0335	.0003	4.72	18	118469	2	5p'	114975	1 5s'	2861.2412
3494.7287	.0008	1.25	27	123255	1	7p	119760	1 6s	2860.6720

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
3497.1292	.0020	0.97	38	124658	2	7p'	121161	2858.7084
3501.3603	.0043	0.80	54	123262	2	7p	119760	2855.2539
3504.0525	.0003	3.47	19	118871	0	5p'	115367	2853.0602
3504.9537	.0005	2.04	103	122718	3	5f	119213	2852.3266
3508.0666	.0003	4.81	18	117151	1	5p	113643	2849.7956
3516.6474	.0003	2.05	67	124136	3	5f'	120619	2842.8419
3518.1904	.0008	1.67	69	124137	3	5f'	120619	2841.5951
3522.7069	.0004	1.63	35	123206	3	7p	119683	2837.9519
3525.4137	.0003	2.05	23	121933	1	5d	118407	2835.7729
3530.8526	.0003	4.34	17	116999	2	5p	113468	2831.4047
3534.7731	.0005	1.87	69	124136	3	5f'	120601	2828.2643
3536.3163	.0003	2.09	73	124137	3	5f'	120601	2827.0301
3536.5335	.0048	1.25	172	124137	2	5f'	120601	2826.8565
3537.2741	.0017	1.20	55	123385	0	7p	119848	2826.2646
3537.5832	.0033	1.00	65	123221	2	7p	119683	2826.0176
3540.3313	.0003	4.46	18	117184	2	5p	113643	2823.8240
3545.7945	.0003	4.27	18	118407	1	5p'	114862	2819.4732
3566.6722	.0026	1.07	61	123774	3	6d	120207	2802.9693
3569.8779	.0003	1.88	19	120753	3	4d'	117184	2800.4522
3573.3636	.0003	4.12	18	116999	2	5p	113426	2797.7205
3576.8590	.0039	0.83	53	123827	2	6d	120250	2794.9865
3578.4471	.0005	1.56	35	123809	2	6d	120230	2793.7461
3578.7552	.0026	0.95	47	123809	2	6d	120230	2793.5055
3582.4919	.0032	0.97	60	123832	3	6d	120250	2790.5918
3597.9620	.0003	4.18	18	118460	1	5p'	114862	2778.5931
3598.3539	.0003	1.81	19	121161	1	6s'	117563	2778.2905
3602.2960	.0003	2.17	18	118407	1	5p'	114805	2775.2501
3617.8589	.0003	2.18	24	122087	2	5d	118469	2763.3119
3619.6875	.0003	2.70	19	120619	2	4d'	116999	2761.9159
3624.8701	.0008	1.42	40	123385	0	7p	119760	2757.9671
3627.3130	.0003	2.56	24	122087	2	5d	118460	2756.1097
3639.7370	.0016	1.05	36	123206	3	7p	119566	2746.7019
3643.2630	.0039	0.84	54	122514	1	5d	118871	2744.0436
3647.1139	.0003	4.30	18	118469	2	5p'	114822	2741.1462
3654.4636	.0003	4.01	18	118460	1	5p'	114805	2735.6333
3658.1322	.0006	1.18	19	120601	2	4d'	116943	2732.8899
3663.9180	.0003	3.01	18	118469	2	5p'	114805	2728.5743
3671.9998	.0003	2.86	61	122696	5	5f	119024	2722.5689
3676.2657	.0003	1.96	37	120619	2	4d'	116943	2719.4096
3682.8532	.0003	3.98	18	117151	1	5p	113468	2714.5454
3691.0920	.0003	2.10	25	122160	3	5d	118469	2708.4864
3694.2020	.0010	1.69	94	122718	[3.5]	5f	119024	2706.2062 B
3694.6143	.0003	1.77	24	122601	1	6p'	118907	2705.9042
3695.4821	.0005	1.68	43	123262	2	7p	119566	2705.2688
3703.0354	.0007	1.21	21	122610	1	6p'	118907	2699.7507
3715.1178	.0003	4.79	18	117184	2	5p	113468	2690.9705
3725.3642	.0003	4.17	18	117151	1	5p	113426	2683.5691
3728.4570	.0015	0.88	23	122635	2	6p'	118907	2681.3431
3737.8865	.0028	0.91	45	124750	0	7p'	121012	2674.5789
3754.1430	.0003	2.60	19	120753	3	4d'	116999	2662.9973
3757.6289	.0003	3.31	18	117184	2	5p	113426	2660.5268
3766.4389	.0003	4.12	18	118407	1	5p'	114641	2654.3036
3775.8378	.0007	1.34	32	123221	2	7p	119445	2647.6965
3779.4472	.0047	0.87	69	122686	1	5f	118907	2645.1679

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})			Lower level ^a (cm^{-1})			Wavelength (nm)
3779.7932	.0003	2.04	57	122686	2	5f	118907	2	4d	2644.9258
3801.2718	.0003	2.27	76	122708	3	5f	118907	2	4d	2629.9810
3810.0638	.0005	1.59	38	123255	1	7p	119445	2	4d	2623.9121
3810.6389	.0036	0.74	40	124061	[3.5]	6g	120250	[3.5]	4f	2623.5161 B
3810.7137	.0003	2.90	20	120753	3	4d'	116943	3	5p	2623.4646
3812.7985	.0051	1.24	178	124063	[4.5]	6g	120250	[3.5]	4f	2622.0301 B
3818.6059	.0008	1.13	20	118460	1	5p'	114641	2	3d'	2618.0425
3825.0158	.0126	1.19	389	124055	[2.5]	6g	120230	2	4f	2613.6552 B
3825.3040	.0059	1.25	209	124055	[2.5]	6g	120230	3	4f	2613.4578 B
3828.0610	.0003	3.28	19	118469	2	5p'	114641	2	3d'	2611.5760
3828.3245	.0003	2.83	22	121012	1	4d'	117184	2	5p	2611.3963
3830.5014	.0106	1.21	343	124061	3	6g	120230	2	4f	2609.9122
3830.7906	.0018	1.75	200	124061	[3.5]	6g	120230	3	4f	2609.7152 B
3836.2337	.0144	1.05	324	125491	[3.5]	6g'	121655	2	4f'	2606.0123
3836.6027	.0062	1.25	222	125491	[3.5]	6g'	121654	3	4f'	2605.7617 B
3837.4857	.0311	0.62	259	125491	[4.5]	6g'	121653	[3.5]	4f'	2605.1621 B
3849.8042	.0008	2.29	307	124057	[5.5]	6g	120207	[4.5]	4f	2596.8262 B
3855.4906	.0165	0.97	307	124063	[4.5]	6g	120207	[4.5]	4f	2592.9962 B
3860.6123	.0009	1.18	26	122330	3	5d	118469	2	5p'	2589.5562
3866.4002	.0026	1.76	294	124055	[2.5]	6g	120189	2	4f	2585.6797 B
3866.8038	.0036	1.61	294	124055	2	6g	120188	1	4f	2585.4098
3874.6649	.0003	1.79	29	122282	2	5d	118407	1	5p'	2580.1644
3895.8981	.0003	4.28	18	118871	0	5p'	114975	1	5s'	2566.1021
3904.9717	.0006	1.49	36	124658	2	7p'	120753	3	4d'	2560.1395
3919.6961	.0003	4.43	18	117563	0	5p	113643	1	5s	2550.5223
3922.4009	.0003	3.73	19	116943	3	5p	113020	3	3d	2548.7635
3940.8940	.0003	1.93	20	120601	2	4d'	116660	1	5p	2536.8031
3945.2764	.0003	1.67	21	121097	0	6s'	117151	1	5p	2533.9852
3959.0191	.0003	1.68	20	120619	2	4d'	116660	1	5p	2525.1892
3977.7190	.0007	1.20	21	121161	1	6s'	117184	2	5p	2513.3178
3978.9716	.0003	4.69	19	116999	2	5p	113020	3	3d	2512.5266
3983.6714	.0007	1.28	24	122635	2	6p'	118651	1	4d	2509.5624
3992.9132	.0013	1.20	42	123206	3	7p	119213	3	4d	2503.7539
4007.7998	.0003	1.91	34	123221	2	7p	119213	3	4d	2494.4540
4012.5897	.0003	1.57	23	121012	1	4d'	116999	2	5p	2491.4763
4024.3750	.0012	1.20	38	124643	1	7p'	120619	2	4d'	2484.1800
4034.6659	.0005	1.74	55	122686	1	5f	118651	1	4d	2477.8438
4035.0096	.0003	2.12	57	122686	2	5f	118651	1	4d	2477.6328
4042.4994	.0017	1.08	40	124643	1	7p'	120601	2	4d'	2473.0423
4048.6680	.0021	0.78	25	123262	2	7p	119213	3	4d	2469.2743
4054.5812	.0015	1.15	42	122514	1	5d	118460	1	5p'	2465.6732
4056.7341	.0018	1.35	79	122708	2	5f	118651	1	4d	2464.3646
4097.4490	.0028	0.67	26	122610	1	6p'	118512	0	4d	2439.8771
4106.7486	.0028	0.87	42	122514	1	5d	118407	1	5p'	2434.3521
4139.1473	.0013	0.98	24	122791	0	6p'	118651	1	4d	2415.2974
4161.9827	.0018	0.79	22	121161	1	6s'	116999	2	5p	2402.0455
4163.2368	.0003	2.73	19	117184	2	5p	113020	3	3d	2401.3219
4171.3499	.0003	4.34	18	111668	0	3d	107496	1	4p'	2396.6515
4173.8640	.0005	1.83	57	122686	1	5f	118512	0	4d	2395.2079
4182.1415	.0003	2.01	36	123206	3	7p	119024	4	4d	2390.4671
4192.6019	.0003	4.81	19	116943	3	5p	112750	4	3d	2384.5030
4193.5551	.0068	1.15	192	124041	2	6f	119848	1	4d	2383.9610
4203.8383	.0075	1.14	206	124052	2	6f	119848	1	4d	2378.1295
4259.7018	.0049	0.49	30	118407	1	5p'	114148	1	3d	2346.9417

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
4265.3208	.0023	0.97	42	123172	1	7p	118907	2343.8499
4311.8672	.0003	1.82	21	118460	1	5p'	114148	2318.5481
4321.6119	.0003	4.28	18	111818	1	3d	107496	2313.3201
4348.2926	.0052	0.69	51	123255	1	7p	118907	2299.1258
4351.9215	.0003	2.82	23	121012	1	4d'	116660	2297.2086
4354.9209	.0005	1.65	45	123262	2	7p	118907	2295.6264
4369.8870	.0003	1.75	25	121933	1	5d	117563	2287.7643
4436.6086	.0003	2.07	22	121097	0	6s'	116660	2253.3589
4471.3904	.0205	0.42	108	125483	2	6f'	121012	2235.8307
4480.5603	.0185	0.73	199	124047	4	6f	119566	2231.2458
4485.2981	.0166	0.79	205	124051	3	6f	119566	2228.8980
4492.1761	.0055	1.31	226	124058	4	6f	119566	2225.4853
4501.3157	.0003	1.92	22	121161	1	6s'	116660	2220.9666
4520.5363	.0012	1.22	41	123172	1	7p	118651	2211.5234
4521.0712	.0003	3.38	20	116660	1	5p	112139	2211.2617
4528.3284	.0003	4.26	19	111818	1	3d	107290	2207.7179
4536.0578	.0003	3.65	19	111668	0	3d	107132	2203.9560
4597.0516	.0042	0.59	33	123468	1	6d	118871	2174.7138
4606.7673	.0388	0.54	269	124052	2	6f	119445	2170.1273
4621.1713	.1252	0.58	952	124871	[4.5]	7g	120250	2163.3631 B
4639.8400	.1223	0.43	658	124870	[3.5]	7g	120230	2154.6587 B
4642.5082	.0003	4.19	19	112139	2	3d	107496	2153.4203
4659.7338	.0060	0.77	71	123172	1	7p	118512	2145.4598
4660.0886	.0303	0.80	382	124867	[5.5]	7g	120207	2145.2964 B
4660.1418	.0150	0.80	189	124867	[5.5]	7g	120207	2145.2719 B
4677.3691	.1915	0.25	681	124866	[2.5]	7g	120189	2137.3707 B
4677.8035	.0695	0.10	175	124866	2	7g	120188	2137.1722
4686.3198	.0003	3.48	19	111818	1	3d	107132	2133.2883
4723.1855	.0006	1.28	21	118871	0	5p'	114148	2116.6375
4729.1871	.0045	1.08	109	125483	3	6f'	120753	2113.9513
4749.2522	.0003	1.67	26	121933	1	5d	117184	2105.0201
4752.4982	.0003	2.68	21	118469	2	5p'	113717	2103.5823
4763.7568	.0003	4.41	20	111818	1	3d	107054	2098.6108
4781.5173	.0013	0.98	24	121933	1	5d	117151	2090.8157
4803.8323	.0003	3.39	21	116943	3	5p	112139	2081.1033
4821.3722	.0003	2.75	23	120188	1	4f	115367	2073.3556
4821.7833	.0003	3.37	23	120189	2	4f	115367	2073.3556
4825.7921	.0003	2.64	21	118469	2	5p'	113643	2071.6332
4833.7383	.0043	1.32	179	124047	4	6f	119213	2068.2276
4841.9676	.0003	3.60	21	116660	1	5p	111818	2064.7125
4845.3393	.0496	0.42	261	124058	4	6f	119213	2063.2758
4849.2246	.0003	4.64	20	112139	2	3d	107290	2061.6226
4860.4029	.0003	3.09	21	116999	2	5p	112139	2056.8812
4863.1981	.0003	1.91	24	120230	2	4f	115367	2055.6989
4863.6156	.0498	0.52	330	125483	3	6f	120619	2055.5225
4881.7088	.0738	0.20	234	125483	3	6f'	120601	2047.9040
4882.2183	.0619	0.39	304	125483	3	6f'	120601	2047.6903
4903.3195	.0005	1.44	27	122087	2	5d	117184	2038.8782
4903.8743	.0022	0.90	34	123373	2	5d'	118469	2038.6475
4913.3272	.0010	1.29	37	123373	2	5d'	118460	2034.7253
4916.4170	.0006	1.46	34	122479	1	7s	117563	2033.4465
4920.6418	.0003	3.75	21	113643	1	5s	108723	2031.7006
4933.5165	.0019	0.88	28	121933	1	5d	116999	2026.3986
4935.5840	.0013	0.84	18	122087	2	5d	117151	2025.5498

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})			Lower level ^a (cm^{-1})			Wavelength (nm)
4938.9606	.0019	0.71	19	118407	1	5p'	113468	2	5s	2024.1650
4981.4677	.0003	2.88	22	118407	1	5p'	113426	2	3d	2006.8927
4991.1242	.0003	2.78	22	118460	1	5p'	113468	2	5s	2003.0098
4992.2295	.0003	3.21	22	116660	1	5p	111668	0	3d	2002.5664
5000.5785	.0003	2.12	22	118469	2	5p'	113468	2	5s	1999.2229
5007.2161	.0003	3.89	20	112139	2	3d	107132	1	4p'	1996.5727
5011.2612	.0069	0.43	37	123882	1	7s'	118871	0	5p'	1994.9610
5012.4035	.0003	3.09	22	117151	1	5p	112139	2	3d	1994.5064
5022.9444	.0055	1.19	171	124047	5	6f	119024	4	4d	1990.3208
5033.6355	.0004	1.57	22	118460	1	5p'	113426	2	3d	1986.0935
5043.0896	.0003	1.65	22	118469	2	5p'	113426	2	3d	1982.3703
5044.6682	.0003	4.11	22	117184	2	5p	112139	2	3d	1981.7499
5088.3662	.0024	0.76	27	123557	3	5d'	118469	2	5p'	1964.7310
5093.3095	.0003	2.01	28	122036	4	5d	116943	3	5p	1962.8241
5098.0554	.0013	1.03	28	123505	2	5'	118407	1	5p'	1960.9969
5134.1000	.0004	1.60	27	121794	0	5d	116660	1	5p	1947.2294
5134.7213	.0111	0.50	70							1946.9938
5143.9814	.0103	0.50	65							1943.4889
5144.1578	.0041	0.63	35	122087	2	5d	116943	3	5p	1943.4222
5144.7379	.0185	0.75	208	124051	3	6f	118907	2	4d	1943.2031
5160.8178	.0014	1.02	30	122160	3	5d	116999	2	5p	1937.1485
5181.2992	.0003	1.82	22	116999	2	5p	111818	1	3d	1929.4911
5213.2166	.0003	1.98	23	120188	1	4f	114975	1	5s'	1917.6779
5213.6287	.0003	2.34	24	120189	2	4f	114975	1	5s'	1917.5264
5227.6566	.0003	2.06	22	118871	0	5p'	113643	1	5s	1912.3809
5255.0438	.0008	1.18	24	120230	2	4f	114975	1	5s'	1902.4143
5256.4671	.0005	1.54	32	122440	2	7s	117184	2	5p	1901.8992
5288.7302	.0078	0.59	61	122440	2	7s	117151	1	5p	1890.2969
5295.7768	.0013	1.27	48	122479	1	7s	117184	2	5p	1887.7817
5325.3649	.0005	1.43	27	124349	3	8p	119024	4	4d	1877.2930
5326.5996	.0003	1.86	28	120188	1	4f	114862	0	5s'	1876.8579
5328.0407	.0008	1.47	43	122479	1	7s	117151	1	5p	1876.3502
5333.2985	.0003	2.75	26	117151	1	5p	111818	1	3d	1874.5005
5362.8422	.0017	1.30	69	122514	1	5d	117151	1	5p	1864.1739
5365.5629	.0003	3.03	26	117184	2	5p	111818	1	3d	1863.2286
5366.7097	.0005	1.50	27	120189	2	4f	114822	3	3d'	1862.8305
5383.1008	.0003	2.19	27	120188	1	4f	114805	2	3d'	1857.1583
5383.5132	.0003	3.06	28	120189	2	4f	114805	2	3d'	1857.0160
5385.2359	.0003	2.86	28	120207	4	4f	114822	3	3d'	1856.4220
5407.8144	.0003	2.69	28	120230	3	4f	114822	3	3d'	1848.6711
5408.1245	.0003	1.74	30	120230	2	4f	114822	3	3d'	1848.5651
5413.1355	.0010	1.40	50	123882	1	7s'	118469	2	5p'	1846.8539
5413.3861	.0029	0.96	52	123873	0	7s'	118460	1	5p'	1846.7684
5422.5872	.0031	0.93	52	123882	1	7s'	118460	1	5p'	1843.6348
5424.6185	.0003	3.57	28	120230	3	4f	114805	2	3d'	1842.9444
5424.9288	.0003	2.67	29	120230	2	4f	114805	2	3d'	1842.8390
5425.1122	.0003	3.97	25	114148	1	3d	108723	0	4p'	1842.7767
5426.9133	.0012	1.22	39	122087	2	5d	116660	1	5p	1842.1651
5427.9369	.0003	2.47	27	120250	3	4f	114822	3	3d'	1841.8177
5427.9759	.0003	3.22	29	120250	4	4f	114822	3	3d'	1841.8045
5440.7264	.0013	1.24	45	122440	2	7s	116999	2	5p	1837.4881
5444.7413	.0003	1.92	28	120250	3	4f	114805	2	3d'	1836.1332
5448.6962	.0003	2.34	27	118469	2	5p'	113020	3	3d	1834.8005
5465.5582	.0017	1.06	39	123873	0	7s'	118407	1	5p'	1829.1398

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	$\log(S/N)$	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
5474.7706	.0003	1.96	31	123882	1 7s'	118407	1 5p'	1826.0619
5480.0418	.0004	1.86	44	122479	1 7s	116999	2 5p	1824.3055
5483.5605	.0003	2.20	26	117151	1 5p	111668	0 3d	1823.1348
5497.2964	.0003	2.08	44	122440	2 7s	116943	3 5p	1818.5794
5547.2429	.0006	1.41	27	120188	1 4f	114641	2 3d'	1802.2052
5547.6563	.0004	1.60	29	120189	2 4f	114641	2 3d'	1802.0709
5580.4771	.0003	4.46	25	111818	1 3d	106238	2 4p	1791.4723
5580.5079	.0003	2.47	20	111668	0 3d	106087	1 4p	1791.4624
5588.7614	.0003	2.38	29	120230	3 4f	114641	2 3d'	1788.8167
5589.0716	.0003	2.85	30	120230	2 4f	114641	2 3d'	1788.7175
5608.8840	.0003	3.51	29	120250	3 4f	114641	2 3d'	1782.3991
5730.6554	.0003	2.93	25	113020	3 3d	107290	2 4p'	1744.5247
5730.7691	.0003	3.79	25	111818	1 3d	106087	1 4p	1744.4901
5744.9275	.0003	2.90	28	117563	0 5p	111818	1 3d	1740.1907
5780.0583	.0004	1.80	45	122440	2 7s	116660	1 5p	1729.6140
5819.3713	.0022	1.09	53	122479	1 7s	116660	1 5p	1717.9295
5901.3725	.0003	5.09	26	112139	2 3d	106238	2 4p	1694.0584
5929.5467	.0003	2.22	26	113426	2 3d	107496	1 4p'	1686.0090
5972.0567	.0003	3.92	27	113468	2 5s	107496	1 4p'	1674.0078
6040.5042	.0003	2.79	31	120188	1 4f	114148	1 3d	1655.0388
6040.9167	.0003	3.72	32	120189	2 4f	114148	1 3d	1654.9258
6051.6654	.0003	4.19	27	112139	2 3d	106087	1 4p	1651.9864
6082.3322	.0003	4.02	33	120230	2 4f	114148	1 3d	1643.6572
6146.8432	.0003	2.85	28	113643	1 5s	107496	1 4p'	1626.4070
6178.7732	.0003	3.56	28	113468	2 5s	107290	2 4p'	1618.0022
6189.3304	.0010	1.49	63	123373	2 5d'	117184	2 5p	1615.2424
6200.7575	.0003	3.17	27	111818	1 3d	105617	2 4p	1612.2657
6252.3992	.0003	4.30	29	114975	1 5s'	108723	0 4p'	1598.9492
6263.6021	.0017	1.08	40	121069	1 6p	114805	2 3d'	1596.0894
6284.3870	.0073	0.80	92	123468	1 6d	117184	2 5p	1590.8105
6287.7156	.0003	3.84	34	121655	2 4f'	115367	1 3d'	1589.9683
6294.2547	.0003	3.22	28	113426	2 3d	107132	1 4p'	1588.3165
6320.6730	.0003	2.84	31	118460	1 5p'	112139	2 3d	1581.6779
6330.1276	.0003	2.39	30	118469	2 5p'	112139	2 3d	1579.3155
6336.7646	.0003	2.24	29	113468	2 5s	107132	1 4p'	1577.6613
6353.5597	.0003	2.75	29	113643	1 5s	107290	2 4p'	1573.4909
6354.1562	.0016	1.04	35	123505	2 5d'	117151	1 5p	1573.3432
6426.8546	.0003	2.55	28	113717	3 3d'	107290	2 4p'	1555.5460
6465.4784	.0020	0.97	37	121271	2 6p	114805	2 3d'	1546.2534
6472.0932	.0003	2.49	32	120189	2 4f	113717	3 3d	1544.6731
6490.6200	.0003	3.67	32	120207	4 4f	113717	3 3d	1540.2640
6495.2257	.0020	1.02	41	121470	0 6p	114975	1 5s'	1539.1718
6511.5511	.0003	3.50	30	113643	1 5s	107132	1 4p'	1535.3128
6513.1985	.0003	3.67	32	120230	3 4f	113717	3 3d	1534.9245
6513.5093	.0003	2.03	35	120230	2 4f	113717	3 3d	1534.8513
6521.6538	.0003	3.79	29	112139	2 3d	105617	2 4p	1532.9345
6533.3600	.0003	4.32	33	120250	4 4f	113717	3 3d	1530.1878
6544.9749	.0003	1.98	32	120188	1 4f	113643	1 5s	1527.4723
6545.3873	.0008	1.49	47	120189	2 4f	113643	1 5s	1527.3761
6558.0881	.0020	1.26	72	123557	3 5d'	116999	2 5p	1524.4181
6586.8027	.0003	2.24	35	120230	2 4f	113643	1 5s	1517.7725
6588.9881	.0003	4.27	30	113643	1 5s	107054	0 4p	1517.2691
6616.1631	.0020	1.17	60	121257	1 6p	114641	2 3d'	1511.0371
6641.5687	.0004	1.78	32	118460	1 5p'	111818	1 3d	1505.2570

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm ⁻¹)	Unc. (cm ⁻¹)	log (S/N)	FWHM (10 ⁻³ cm ⁻¹)	Upper level ^a (cm ⁻¹)		Lower level ^a (cm ⁻¹)		Wavelength (nm)
6644.2443	.0003	4.82	31	115367	1 3d'	108723	0 4p'	1504.6505
6651.0239	.0003	2.57	32	118469	2 5p'	111818	1 3d	1503.1171
6651.3147	.0003	3.12	30	114148	1 3d	107496	1 4p'	1503.0514
6676.1637	.0003	1.87	30	112139	2 3d	105463	3 4p	1497.4569
6679.5614	.0003	2.16	34	121655	2 4f'	114975	1 5s'	1496.6952
6710.4045	.0012	1.45	65	123653	4 6d	116943	3 5p	1489.8159
6719.7626	.0005	1.58	31	120188	1 4f	113468	2 5s	1487.7412
6720.1741	.0003	2.38	34	120189	2 4f	113468	2 5s	1487.6501
6739.6641	.0003	2.10	33	118407	1 5p'	111668	0 3d	1483.3481
6761.2791	.0003	2.92	33	120230	3 4f	113468	2 5s	1478.6060
6761.5892	.0003	2.09	34	120230	2 4f	113468	2 5s	1478.5382
6762.2723	.0003	2.24	33	120188	1 4f	113426	2 3d	1478.3888
6762.6812	.0008	1.44	41	120189	2 4f	113426	2 3d	1478.2994
6781.4033	.0005	1.64	38	120250	3 4f	113468	2 5s	1474.2181
6782.8037	.0003	3.52	30	113020	3 3d	106238	2 4p	1473.9137
6791.8316	.0003	2.23	32	118460	1 5p'	111668	0 3d	1471.9546
6803.7904	.0003	2.41	34	120230	3 4f	113426	2 3d	1469.3674
6804.1004	.0003	3.49	35	120230	2 4f	113426	2 3d	1469.3004
6807.9810	.0018	1.34	78	123468	1 6d	116660	1 5p	1468.4629
6823.9129	.0003	4.15	34	120250	3 4f	113426	2 3d	1465.0345
6831.3425	.0003	4.14	34	121653	4 4f'	114822	3 3d'	1463.4411
6832.2944	.0003	2.81	33	121654	3 4f'	114822	3 3d'	1463.2372
6832.6383	.0004	1.91	37	121655	2 4f'	114822	3 3d'	1463.1645
6848.1066	.0003	2.10	34	121653	3 4f'	114805	2 3d'	1459.8586
6849.0986	.0003	3.90	34	121654	3 4f'	114805	2 3d'	1459.6472
6849.4457	.0003	2.67	35	121655	2 4f'	114805	2 3d'	1459.5732
6858.0314	.0003	2.68	31	114148	1 3d	107290	2 4p'	1457.7459
6960.4610	.0016	1.05	36	123903	2 8s	116943	3 5p	1436.2938
7012.2491	.0003	3.92	35	121653	3 4f'	114641	2 3d'	1425.6862
7013.2417	.0007	1.42	35	121654	3 4f'	114641	2 3d'	1425.4845
7013.5887	.0003	2.70	35	121655	2 4f'	114641	2 3d'	1425.4139
7016.0228	.0003	3.86	32	114148	1 3d	107132	1 4p'	1424.9194
7052.8888	.0003	2.11	34	118871	0 5p'	111818	1 3d	1417.4712
7093.4598	.0003	4.80	33	114148	1 3d	107054	0 4p	1409.3640
7109.4333	.0010	1.42	51	121257	1 6p	114148	1 3d	1406.1974
7144.5754	.0003	2.55	31	114641	2 3d'	107496	1 4p'	1399.2807
7168.2913	.0008	1.45	40	120189	2 4f	113020	3 3d	1394.6513
7186.8195	.0003	4.16	36	120207	4 4f	113020	3 3d	1391.0558
7188.4115	.0003	3.60	32	113426	2 3d	106238	2 4p	1390.7477
7209.3980	.0003	2.40	35	120230	3 4f	113020	3 3d	1386.6992
7209.7084	.0003	2.24	38	120230	2 4f	113020	3 3d	1386.6395
7229.5208	.0003	3.32	36	120250	3 4f	113020	3 3d	1382.8394
7229.5596	.0003	2.97	36	120250	4 4f	113020	3 3d	1382.8320
7230.9218	.0003	4.20	33	113468	2 5s	106238	2 4p	1382.5715
7287.3941	.0003	5.47	36	112750	4 3d	105463	3 4p	1371.8575
7308.7184	.0003	4.92	33	114805	2 3d'	107496	1 4p'	1367.8549
7319.5339	.0008	1.69	75	122686	2 5f	115367	1 3d'	1365.8337 B
7322.4961	.0007	1.58	47	121470	0 6p	114148	1 3d	1365.2812
7338.7045	.0003	5.07	33	113426	2 3d	106087	1 4p	1362.2658
7351.2921	.0003	4.23	33	114641	2 3d'	107290	2 4p'	1359.9332
7365.2190	.0003	3.89	34	114862	0 5s'	107496	1 4p'	1357.3617
7381.2145	.0003	3.74	33	113468	2 5s	106087	1 4p	1354.4202
7403.0851	.0003	5.34	35	113020	3 3d	105617	2 4p	1350.4189
7405.7081	.0003	4.18	34	113643	1 5s	106238	2 4p	1349.9406

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm ⁻¹)	Unc. (cm ⁻¹)	log (S/N)	FWHM (10 ⁻³ cm ⁻¹)	Upper level ^a (cm ⁻¹)		Lower level ^a (cm ⁻¹)			Wavelength (nm)	
7448.8049	.0014	1.18	40	121165	3	6p	113717	3	3d	1342.1302
7456.9807	.0003	4.39	37	120207	5	4f	112750	4	3d	1340.6587
7475.2491	.0012	1.35	51	121192	2	6p	113717	3	3d	1337.3823
7478.6019	.0003	3.94	34	114975	1	5s'	107496	1	4p'	1336.7827
7479.0030	.0003	5.23	35	113717	3	3d	106238	2	4p	1336.7110
7479.5986	.0003	2.14	38	120230	3	4f	112750	4	3d	1336.6046
7499.7604	.0003	3.41	37	120250	4	4f	112750	4	3d	1333.0114
7506.8488	.0003	2.11	38	121655	2	4f'	114148	1	3d	1331.7527
7509.2835	.0003	5.02	34	114641	2	3d'	107132	1	4p'	1331.3209
7515.4349	.0003	3.45	33	114805	2	3d'	107290	2	4p'	1330.2312
7532.2390	.0003	5.18	35	114822	3	3d'	107290	2	4p'	1327.2635
7548.5433	.0004	1.81	41	121192	2	6p	113643	1	5s	1324.3967
7554.0597	.0004	1.96	45	121271	2	6p	113717	3	3d	1323.4295
7556.0010	.0003	4.42	34	113643	1	5s	106087	1	4p	1323.0895
7557.5951	.0003	4.63	34	113020	3	3d	105463	3	4p	1322.8104
7565.6667	.0003	4.59	33	111668	0	3d	104102	1	4p	1321.3992
7600.2631	.0008	1.55	49	121069	1	6p	113468	2	5s	1315.3842
7613.8980	.0005	1.70	39	121257	1	6p	113643	1	5s	1313.0286
7626.2064	.0071	0.46	41	122601	1	6p'	114975	1	5s'	1310.9094
7627.3559	.0010	1.36	44	121271	2	6p	113643	1	5s	1310.7118
7660.0431	.0006	1.63	44	122635	2	6p'	114975	1	5s'	1305.1187
7673.4263	.0003	3.23	34	114805	2	3d'	107132	1	4p'	1302.8424
7685.3185	.0003	4.60	35	114975	1	5s'	107290	2	4p'	1300.8264
7696.8884	.0004	2.07	43	121165	3	6p	113468	2	5s	1298.8710
7715.9287	.0003	4.94	34	111818	1	3d	104102	1	4p	1295.6659
7729.9269	.0003	4.09	35	114862	0	5s'	107132	1	4p'	1293.3195
7748.0090	.0131	0.16	38	122610	1	6p'	114862	0	5s'	1290.3012
7765.8417	.0010	1.45	51	121192	2	6p	113426	2	3d	1287.3383
7802.1377	.0004	1.81	41	121271	2	6p	113468	2	5s	1281.3495
7808.6929	.0003	4.72	35	113426	2	3d	105617	2	4p	1280.2738
7813.1258	.0005	1.77	48	122635	2	6p'	114822	3	3d'	1279.5474
7815.5226	.0012	1.42	62	122791	0	6p'	114975	1	5s'	1279.1550
7826.9723	.0005	1.78	46	121470	0	6p	113643	1	5s	1277.2838
7831.1933	.0006	1.68	50	121257	1	6p	113426	2	3d	1276.5954
7843.3100	.0003	3.86	36	114975	1	5s'	107132	1	4p'	1274.6232
7851.2029	.0003	4.04	35	113468	2	5s	105617	2	4p	1273.3418
7870.4485	.0003	4.64	36	115367	1	3d'	107496	1	4p'	1270.2281
7873.7454	.0047	0.74	51							1269.6962
7881.2694	.0037	0.88	56	122686	2	5f	114805	2	3d'	1268.4841
7895.9030	.0065	0.91	105	122718	4	5f	114822	3	3d'	1266.1332
7902.7445	.0047	0.74	51	122708	3	5f	114805	2	3d'	1265.0371
7910.1795	.0003	2.89	36	114148	1	3d	106238	2	4p	1263.8480
7920.7469	.0003	3.15	36	114975	1	5s'	107054	0	4p	1262.1619
7936.7267	.0003	2.65	39	121653	4	4f'	113717	3	3d	1259.6206
7937.6794	.0008	1.31	31	121654	3	4f'	113717	3	3d	1259.4695
7963.2029	.0003	3.11	35	113426	2	3d	105463	3	4p	1255.4326
7968.6520	.0011	1.27	38	122610	1	6p'	114641	2	3d'	1254.5741
8005.7130	.0003	4.88	38	113468	2	5s	105463	3	4p	1248.7663
8025.9896	.0003	4.66	37	113643	1	5s	105617	2	4p	1245.6114
8036.8250	.0003	4.85	36	112139	2	3d	104102	1	4p	1243.9321
8049.3114	.0003	2.25	38	120188	1	4f	112139	2	3d	1242.0024
8049.7243	.0003	3.23	39	120189	2	4f	112139	2	3d	1241.9387
8060.4725	.0003	4.78	37	114148	1	3d	106087	1	4p	1240.2827
8076.8285	.0027	1.10	68	122718	3	5f	114641	2	3d'	1237.7710

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})			Lower level ^a (cm^{-1})			Wavelength (nm)
8090.8295	.0003	3.78	39	120230	3	4f	112139	2	3d	1235.6291
8091.1398	.0003	2.66	40	120230	2	4f	112139	2	3d	1235.5817
8099.2843	.0003	4.22	36	113717	3	3d	105617	2	4p	1234.3392
8145.0037	.0022	1.08	52	121165	3	6p	113020	3	3d	1227.4106
8171.4491	.0004	1.98	46	121192	2	6p	113020	3	3d	1223.4383
8185.7581	.0012	1.37	56	121654	3	4f ^r	113468	2	5s	1221.2997
8227.2780	.0003	3.02	40	121653	3	4f ^r	113426	2	3d	1215.1363
8228.2703	.0006	1.48	33	121654	3	4f ^r	113426	2	3d	1214.9898
8228.6167	.0005	1.72	40	121655	2	4f ^r	113426	2	3d	1214.9386
8235.1565	.0003	4.34	38	115367	1	3d'	107132	1	4p'	1213.9738
8253.7944	.0003	4.50	37	113717	3	3d	105463	3	4p	1211.2325
8312.5935	.0003	3.38	38	115367	1	3d'	107054	0	4p	1202.6648
8370.2083	.0003	3.26	40	120188	1	4f	111818	1	3d	1194.3865
8370.6209	.0003	3.51	41	120189	2	4f	111818	1	3d	1194.3276
8403.4405	.0003	2.80	37	114641	2	3d'	106238	2	4p	1189.6632
8412.0363	.0003	3.00	42	120230	2	4f	111818	1	3d	1188.4475
8415.2098	.0004	2.10	46	121165	3	6p	112750	4	3d	1187.9993
8520.4703	.0003	3.32	40	120188	1	4f	111668	0	3d	1173.3229
8530.4611	.0003	3.61	38	114148	1	3d	105617	2	4p	1171.9488
8538.3141	.0034	0.95	60	122686	1	5f	114148	1	3d	1170.8709
8538.6632	.0013	1.62	103	122686	2	5f	114148	1	3d	1170.8230
8553.7333	.0003	2.65	38	114641	2	3d'	106087	1	4p	1168.7602
8560.3877	.0005	2.38	158	122708	2	5f	114148	1	3d	1167.8517
8567.5832	.0003	4.33	38	114805	2	3d'	106238	2	4p	1166.8709
8584.3886	.0013	1.18	37	114822	3	3d'	106238	2	4p	1164.5865
8632.9262	.0003	2.59	42	121653	4	4f ^r	113020	3	3d	1158.0387
8633.8790	.0011	1.32	44	121654	3	4f ^r	113020	3	3d	1157.9109
8702.2714	.0003	4.13	39	104102	1	4p	95400	1	4s'	1148.8107
8717.8762	.0003	3.34	38	114805	2	3d'	106087	1	4p	1146.7544
8737.4668	.0003	3.70	39	114975	1	5s'	106238	2	4p	1144.1832
8770.5680	.0093	0.79	115	124137	2	5f ^r	115367	1	3d'	1139.8649
8774.3768	.0004	3.31	39	114862	0	5s'	106087	1	4p	1139.3701
8887.7599	.0004	2.03	40	114975	1	5s'	106087	1	4p	1124.8349
8929.8069	.0025	0.90	40	121069	1	6p	112139	2	3d	1119.5384
8979.1216	.0014	1.61	112	122696	4	5f	113717	3	3d	1113.3898
8991.3269	.0228	0.42	120	122708	3	5f	113717	3	3d	1111.8784
9001.2763	.0008	2.10	166	122718	3	5f	113717	3	3d	1110.6494
9023.7218	.0004	3.63	40	114641	2	3d'	105617	2	4p	1107.8868
9026.4358	.0029	0.89	45	121165	3	6p	112139	2	3d	1107.5536
9118.2337	.0024	0.97	45	121257	1	6p	112139	2	3d	1096.4033
9129.3133	.0004	3.24	41	115367	1	3d'	106238	2	4p	1095.0727
9131.6914	.0005	1.81	49	121271	2	6p	112139	2	3d	1094.7875
9175.2882	.0004	2.17	45							1089.5855
9178.2318	.0004	2.55	40	114641	2	3d'	105463	3	4p	1089.2361
9187.8647	.0004	3.39	40	114805	2	3d'	105617	2	4p	1088.0941
9204.6688	.0004	2.35	41	114822	3	3d'	105617	2	4p	1086.1077
9250.7077	.0011	1.37	48	121069	1	6p	111818	1	3d	1080.7023
9279.6063	.0004	2.63	42	115367	1	3d'	106087	1	4p	1077.3368
9282.1503	.0037	1.33	158	122708	2	5f	113426	2	3d	1077.0415
9313.7480	.0007	2.03	130	124136	4	5f ^r	114822	3	3d'	1073.3875
9315.2458	.0076	0.85	107	124137	3	5f ^r	114822	3	3d'	1073.2149 ?
9323.8646	.0005	1.74	41	113426	2	3d	104102	1	4p	1072.2229
9332.0600	.0011	1.80	124	124137	3	5f ^r	114805	2	3d'	1071.2813
9342.3745	.0004	2.87	41	114805	2	3d'	105463	3	4p	1070.0985

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Wavenumber (cm ⁻¹)	Unc. (cm ⁻¹)	log (S/N)	FWHM (10 ⁻³ cm ⁻¹)	Upper level ^a (cm ⁻¹)		Lower level ^a (cm ⁻¹)		Wavelength (nm)
9357.7483	.0004	2.55	42	114975	1 5s'	105617	2 4p	1068.3404
9359.1787	.0004	3.80	41	114822	3 3d'	105463	3 4p	1068.1771
9366.3742	.0004	4.52	43	113468	2 5s	104102	1 4p	1067.3565
9400.9699	.0020	1.18	60	121069	1 6p	111668	0 3d	1063.4286
9439.1217	.0012	1.33	47	121257	1 6p	111818	1 3d	1059.1304
9452.5840	.0022	1.15	61	121271	2 6p	111818	1 3d	1057.6220
9494.6660	.0005	2.14	77	124136	3 5f'	114641	2 3d'	1052.9344
9515.3098	.0004	2.95	45	121654	3 4f'	112139	2 3d	1050.6500
9515.6569	.0005	1.84	48	121655	2 4f'	112139	2 3d	1050.6117
9541.1608	.0004	3.95	43	113643	1 5s	104102	1 4p	1047.8034
9548.4347	.0004	4.73	42	104102	1 4p	94554	0 4s'	1047.0051
9675.3296	.0005	2.39	113	122696	4 5f	113020	3 3d	1033.2743
9697.4736	.0021	1.57	151	122718	3 5f	113020	3 3d	1030.9155
9749.5947	.0004	2.06	45	115367	1 3d'	105617	2 4p	1025.4026
9836.5531	.0004	2.27	48	121655	2 4f'	111818	1 3d	1016.3377
9928.7757	.0004	2.21	45	118651	1 4d	108723	0 4p'	1006.8975
9945.4830	.0004	2.57	114	122696	5 5f	112750	4 3d	1005.2060
9967.6693	.0033	1.45	182	122718	3 5f	112750	4 3d	1002.9686
10200.3194	.0055	0.70	55	123221	2 7p	113020	3 3d	980.0927
10217.4425	.0004	4.55	49	105617	2 4p	95400	1 4s'	978.4502
10341.7253	.0072	0.90	114	124058	3 6f	113717	3 3d	966.6915 B
10351.5020	.0004	4.80	58	104102	1 4p	93751	1 4s	965.7785
10419.1483	.0062	0.75	69	124136	4 5f'	113717	3 3d	959.5081
10455.6379	.0034	0.87	50	123206	3 7p	112750	4 3d	956.1595
10547.4896	.0012	1.58	84	122686	2 5f	112139	2 3d	947.8328
10569.2113	.0045	0.95	79	122708	2 5f	112139	2 3d	945.8849
10632.2932	.0082	0.90	130	124058	3 6f	113426	2 3d	940.2729 B
10660.7525	.0258	0.68	247	125483	4 6f'	114822	3 3d'	937.7628
10678.0032	.0110	0.62	92	125483	3 6f'	114805	2 3d'	936.2478
10687.4309	.0004	4.14	48	106087	1 4p	95400	1 4s'	935.4219
10703.0310	.0031	0.90	48	114805	2 3d'	104102	1 4p	934.0579
10709.7104	.0031	1.11	80	124136	3 5f'	113426	2 3d	933.4763
10759.5356	.0004	3.02	47	114862	0 5s'	104102	1 4p	929.1530
10837.7237	.0004	4.62	63	106238	2 4p	95400	1 4s'	922.4498
10841.6683	.0175	0.68	167	125483	3 6f'	114641	2 3d'	922.1142 B
10868.0457	.0010	1.61	71	122686	1 5f	111818	1 3d	919.8770
10868.3873	.0007	1.86	71	122686	2 5f	111818	1 3d	919.8479
10872.9204	.0004	3.27	47	114975	1 5s'	104102	1 4p	919.4637
10890.1131	.0023	1.25	81	122708	2 5f	111818	1 3d	918.0127
10958.3386	.0007	5.89	71	104102	1 4p	93144	2 4s	912.2990
11015.7819	.0005	2.13	49	118512	0 4d	107496	1 4p'	907.5393
11018.3070	.0009	1.64	70	122686	1 5f	111668	0 3d	907.3319
11037.5531	.0027	1.03	57	119760	1 6s	108723	0 4p'	905.7492
11154.9795	.0009	1.52	48	118651	1 4d	107496	1 4p'	896.2145
11264.7696	.0030	0.86	43	115367	1 3d'	104102	1 4p	887.4797
11296.4703	.0036	1.34	157	124047	5 6f	112750	4 3d	884.9917 ?
11361.6963	.0005	1.97	49	118651	1 4d	107290	2 4p'	879.9086
11380.4908	.0017	1.23	54	118512	0 4d	107132	1 4p'	878.4554
11410.1956	.0005	2.39	49	118907	2 4d	107496	1 4p'	876.1685
11519.6873	.0006	1.74	49	118651	1 4d	107132	1 4p'	867.8407
11533.5942	.0005	4.18	51	106087	1 4p	94554	0 4s'	866.7943
11597.1244	.0005	2.19	50	118651	1 4d	107054	0 4p	862.0459
11616.9120	.0005	2.37	50	118907	2 4d	107290	2 4p'	860.5775
11654.4522	.0032	0.86	46	107054	0 4p	95400	1 4s'	857.8055

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
11731.8805	.0005	4.28	73	107132	1	4p'	95400	852.1441
11774.9031	.0011	1.38	46	118907	2	4d	107132	849.0306
11840.2156	.0157	0.55	111	124861	4	7f	113020	844.3472 ?
11866.6727	.0005	4.27	112	105617	2	4p	93751	842.4647 R
11889.8716	.0005	4.25	105	107290	2	4p'	95400	840.8209 R
11912.4488	.0055	0.93	94	124051	3	6f	112139	839.2273 ?
11912.7258	.0130	0.22	43	124052	2	6f	112139	839.2078 B
11923.1757	.0007	1.66	51	119213	3	4d	107290	838.4723
11998.2807	.0071	0.77	83	124137	3	5f'	112139	833.2237
12096.5884	.0005	4.16	76	107496	1	4p'	95400	826.4521
12186.6678	.0028	1.00	55	119683	2	6s	107496	820.3433
12313.1259	.0010	1.50	54	119445	2	4d	107132	811.9182
12318.9991	.0005	4.22	141	105463	3	4p	93144	811.5311 R
12336.6612	.0005	4.22	100	106087	1	4p	93751	810.3692 R
12351.3487	.0027	0.97	50	119848	1	4d	107496	809.4056
12393.3829	.0020	1.12	51	119683	2	6s	107290	806.6603
12413.8443	.0005	2.08	53	118651	1	4d	106238	805.3307
12424.9399	.0008	1.60	53	118512	0	4d	106087	804.6115
12438.6957	.0017	1.28	62	121161	1	6s'	108723	803.7217
12473.5104	.0005	4.32	87	105617	2	4p	93144	801.4785 R
12486.9545	.0005	4.24	66	106238	2	4p	93751	800.6155
12578.0436	.0005	4.25	83	107132	1	4p'	94554	794.8175 R
12628.4665	.0023	1.08	55	119760	1	6s	107132	791.6440
12669.0604	.0005	2.19	53	118907	2	4d	106238	789.1074
12705.9011	.0012	1.42	56	119760	1	6s	107054	786.8194
12716.0561	.0032	0.95	57	119848	1	4d	107132	786.1910
12793.4975	.0047	0.86	68	119848	1	4d	107054	781.4326
12819.3559	.0016	1.22	52	118907	2	4d	106087	779.8556
12942.7518	.0005	4.16	73	107496	1	4p'	94554	772.4206
12943.4991	.0005	4.21	63	106087	1	4p	93144	772.3760
12975.3203	.0023	1.00	45	119213	3	4d	106238	770.4818
13034.1248	.0009	1.54	55	118651	1	4d	105617	767.0057
13093.7911	.0005	4.19	123	106238	2	4p	93144	763.5105 R
13104.4750	.0010	1.52	59	120601	2	4d'	107496	762.8880
13122.6038	.0008	1.77	64	120619	2	4d'	107496	761.8335 B
13210.2160	.0058	0.82	76	121933	1	5d	108723	756.7815
13303.6742	.0005	4.23	80	107054	0	4p	93751	751.4651
13311.1897	.0009	1.61	54	120601	2	4d'	107290	751.0408
13322.7911	.0005	4.35	75	108723	0	4p'	95400	750.3868
13328.4986	.0017	1.26	57	119566	3	4d	106238	750.0655
13357.5779	.0007	1.81	56	119445	2	4d	106087	748.4326
13381.1108	.0006	2.05	54	107132	1	4p'	93751	747.1163
13443.8523	.0008	1.69	54	118907	2	4d	105463	743.6297
13445.5300	.0006	2.15	56	119683	2	6s	106238	743.5369
13463.7726	.0008	1.64	56	120753	3	4d'	107290	742.5294
13469.1842	.0040	0.87	58	120601	2	4d'	107132	742.2311
13487.3079	.0008	1.68	55	120619	2	4d'	107132	741.2337
13522.6205	.0007	1.87	56	119760	1	6s	106238	739.2980
13539.1027	.0005	4.26	82	107290	2	4p'	93751	738.3980
13560.8872	.0005	2.81	56	119024	4	4d	105463	737.2118
13595.6041	.0006	2.36	57	119213	3	4d	105617	735.3293
13595.8213	.0016	1.25	54	119683	2	6s	106087	735.3176
13600.1892	.0015	1.27	52	121097	0	6s'	107496	735.0814
13664.8971	.0007	1.84	57	121161	1	6s'	107496	731.6006

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
13672.9133	.0006	2.07	57	119760	1 6s	106087	1 4p	731.1716
13722.2228	.0029	1.03	60	121012	1 4d'	107290	2 4p'	728.5442
13745.8191	.0005	3.80	58	107496	1 4p'	93751	1 4s	727.2936
13750.1138	.0011	1.46	53	119213	3 4d	105463	3 4p	727.0664
13760.5079	.0010	1.55	62	119848	1 4d	106087	1 4p	726.5172
13827.5643	.0033	0.91	53	119445	2 4d	105617	2 4p	722.9943
13871.6141	.0006	2.27	57	121161	1 6s'	107290	2 4p'	720.6981
13957.6474	.0038	0.98	71	121012	1 4d'	107054	0 4p	716.2561
13964.8985	.0009	1.65	61	121097	0 6s'	107132	1 4p'	715.8838
13987.9487	.0006	3.50	56	107132	1 4p'	93144	2 4s	714.7041
14029.6054	.0008	1.77	59	121161	1 6s'	107132	1 4p'	712.5820
14065.8104	.0007	1.85	57	119683	2 6s	105617	2 4p	710.7478
14107.0439	.0022	1.10	53	121161	1 6s'	107054	0 4p	708.6704
14142.9014	.0006	2.42	58	119760	1 6s	105617	2 4p	706.8736
14145.9401	.0006	4.23	68	107290	2 4p'	93144	2 4s	706.7218
14220.3212	.0006	2.62	59	119683	2 6s	105463	3 4p	703.0252
14297.6829	.0026	1.10	64	121794	0 5d	107496	1 4p'	699.2212
14352.6567	.0006	4.17	70	107496	1 4p'	93144	2 4s	696.5430
14363.3400	.0011	1.48	59	120601	2 4d'	106238	2 4p	696.0250
14381.4656	.0012	1.44	59	120619	2 4d'	106238	2 4p	695.1477
14410.0995	.0006	2.34	59	118512	0 4d	104102	1 4p	693.7664
14513.6311	.0010	1.56	59	120601	2 4d'	106087	1 4p	688.8175
14515.9204	.0017	1.22	53	120753	3 4d'	106238	2 4p	688.7088
14531.7581	.0014	1.37	59	120619	2 4d'	106087	1 4p	687.9582
14549.2966	.0006	2.74	59	118651	1 4d	104102	1 4p	687.1289
14643.1510	.0030	1.06	68	121933	1 5d	107290	2 4p'	682.7248
14774.3674	.0011	1.52	62	121012	1 4d'	106238	2 4p	676.6612
14797.2184	.0019	1.27	66	122087	2 5d	107290	2 4p'	675.6165
14801.1458	.0057	0.75	64	121933	1 5d	107132	1 4p'	675.4370
14804.5129	.0006	2.72	60	118907	2 4d	104102	1 4p	675.2834
14878.5769	.0030	1.07	70	121933	1 5d	107054	0 4p	671.9218
14923.7635	.0022	1.16	61	121161	1 6s'	106238	2 4p	669.8874
14972.0217	.0006	2.62	59	108723	0 4p'	93751	1 4s	667.7281
15001.7457	.0017	1.28	59	120619	2 4d'	105617	2 4p	666.4051
15009.3499	.0020	1.15	55	121097	0 6s'	106087	1 4p	666.0675
15136.2016	.0010	1.60	61	120753	3 4d'	105617	2 4p	660.4854
15290.7116	.0016	1.33	61	120753	3 4d'	105463	3 4p	653.8112
15394.6522	.0056	0.81	72	121012	1 4d'	105617	2 4p	649.3968
15459.9161	.0085	0.78	102	122514	1 5d	107054	0 4p	646.6554
15544.0411	.0039	0.88	59	121161	1 6s'	105617	2 4p	643.1556
15580.9823	.0006	2.35	64	119683	2 6s	104102	1 4p	641.6307
15658.0726	.0008	1.75	63	119760	1 6s	104102	1 4p	638.4717
15695.2938	.0020	1.27	69	121933	1 5d	106238	2 4p	636.9576
15706.8445	.0044	0.94	75	121794	0 5d	106087	1 4p	636.4892
15849.3651	.0012	1.50	67	122087	2 5d	106238	2 4p	630.7657
15876.5080	.0020	1.33	83	123373	2 5d'	107496	1 4p'	629.6866
16083.2263	.0029	1.08	68	123373	2 5d'	107290	2 4p'	621.5939
16092.1163	.0017	1.36	71	122330	3 5d	106238	2 4p	621.2505
16194.8413	.0015	1.40	66	122282	2 5d	106087	1 4p	617.3098
16202.5128	.0020	1.26	69	122440	2 7s	106238	2 4p	617.0175
16215.7974	.0077	0.70	77	123505	2 5d'	107290	2 4p'	616.5120
16241.8345	.0046	0.93	77	122479	1 7s	106238	2 4p	615.5237
16267.7212	.0017	1.32	66	123557	3 5d'	107290	2 4p'	614.5442
16373.7785	.0016	1.36	68	123505	2 5d'	107132	1 4p'	610.5636

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Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})			Lower level ^a (cm^{-1})			Wavelength (nm)
16376.5857	.0057	0.83	76	123873	0	7s'	107496	1	4p'	610.4589
16392.1213	.0025	1.20	77	122479	1	7s	106087	1	4p	609.8804
16498.7909	.0009	1.74	67	120601	2	4d'	104102	1	4p	605.9373
16516.9178	.0015	1.41	69	120619	2	4d'	104102	1	4p	605.2723
16542.8781	.0008	1.93	70	122160	3	5d	105617	2	4p	604.3224
16573.3095	.0007	2.33	69	122036	4	5d	105463	3	4p	603.2128
16592.5002	.0035	0.97	65	123882	1	7s'	107290	2	4p'	602.5151
16624.1544	.0044	0.87	65	122087	2	5d	105463	3	4p	601.3678
16697.3880	.0026	1.10	62	122160	3	5d	105463	3	4p	598.7303
16822.7950	.0039	0.93	66	122440	2	7s	105617	2	4p	594.2669
16862.1077	.0015	1.43	75	122479	1	7s	105617	2	4p	592.8814
16909.8197	.0008	1.97	70	121012	1	4d'	104102	1	4p	591.2086
16977.3094	.0012	1.70	105	122440	2	7s	105463	3	4p	588.8580
16994.5069	.0015	1.39	66	121097	0	6s'	104102	1	4p	588.2624
17059.2146	.0014	1.44	68	121161	1	6s'	104102	1	4p	586.0311
17135.3729	.0036	0.99	69	123373	2	5d'	106238	2	4p	583.4264
17319.8714	.0076	0.89	117	123557	3	5d'	106238	2	4p	577.2118
17418.2292	.0019	1.26	66	123505	2	5d'	106087	1	4p	573.9520
17692.0003	.0011	1.65	74	121794	0	5d	104102	1	4p	565.0704
17830.7477	.0008	1.95	72	121933	1	5d	104102	1	4p	560.6734
17940.1488	.0018	1.36	78	123557	3	5d'	105617	2	4p	557.2543
17984.8161	.0009	1.86	73	122087	2	5d	104102	1	4p	555.8703
18156.5910	.0043	1.02	88	123774	3	6d	105617	2	4p	550.6113 B
18190.4151	.0012	1.66	82	123653	4	6d	105463	3	4p	549.5875
18337.9668	.0020	1.33	79	122440	2	7s	104102	1	4p	545.1655
19147.0962	.0060	1.03	128	124610	4	7d	105463	3	4p	522.1271
19270.8283	.0016	1.51	87	123373	2	5d'	104102	1	4p	518.7746
19365.8730	.0018	1.41	81	123468	1	6d	104102	1	4p	516.2284
19406.8306	.0052	0.95	91	123509	0	6d	104102	1	4p	515.1390
19757.0357	.0198	0.74	217	125220	4	8d	105463	3	4p	506.0078
21260.1678	.0012	1.67	85	116660	1	5p	95400	1	4s'	470.2316
21599.5004	.0021	1.35	85	116999	2	5p	95400	1	4s'	462.8441
21751.5042	.0016	1.54	90	117151	1	5p	95400	1	4s'	459.6096
22106.3349	.0015	1.54	87	116660	1	5p	94554	0	4s'	452.2322
22163.1303	.0009	2.17	89	117563	0	5p	95400	1	4s'	451.0733
22909.3977	.0070	0.82	92	116660	1	5p	93751	1	4s	436.3793
23007.6035	.0012	1.77	93	118407	1	5p'	95400	1	4s'	434.5168
23059.7718	.0012	1.81	92	118460	1	5p'	95400	1	4s'	433.5338
23069.2269	.0010	2.25	94	118469	2	5p'	95400	1	4s'	433.3561
23248.7308	.0010	2.29	94	116999	2	5p	93751	1	4s	430.0101
23400.7318	.0010	2.38	93	117151	1	5p	93751	1	4s	427.2169
23432.9967	.0010	2.13	93	117184	2	5p	93751	1	4s	426.6286
23471.0911	.0010	2.45	95	118871	0	5p'	95400	1	4s'	425.9362
23516.2369	.0015	1.59	94	116660	1	5p	93144	2	4s	425.1185
23798.9979	.0010	2.76	96	116943	3	5p	93144	2	4s	420.0674
23812.3612	.0010	2.50	95	117563	0	5p	93751	1	4s	419.8317
23853.7677	.0011	1.98	96	118407	1	5p'	94554	0	4s'	419.1029
23855.5677	.0010	2.13	95	116999	2	5p	93144	2	4s	419.0713
23905.9348	.0011	1.97	94	118460	1	5p'	94554	0	4s'	418.1883
24007.5691	.0011	1.89	95	117151	1	5p	93144	2	4s	416.4179
24039.8337	.0010	2.76	97	117184	2	5p	93144	2	4s	415.8590
24656.8287	.0103	0.77	121	118407	1	5p'	93751	1	4s	405.4527
24709.0026	.0065	0.89	100	118460	1	5p'	93751	1	4s	404.5965
24718.4566	.0011	1.97	99	118469	2	5p'	93751	1	4s	404.4418

Table 1. Ar I lines observed in the hollow cathode spectrum. The vacuum wavenumber (cm^{-1}) in the first column has been converted to wavelength in standard air in the last column. Upper and lower levels are identified by the integer part of the level energy in cm^{-1} , J -value (or $[K]$ -value if individual J levels are not resolved), and configuration. Descriptive notes at the far right are as follows: B = blended line; R = reversed; ? = uncertain classification—Continued

Wavenumber (cm^{-1})	Unc. (cm^{-1})	log (S/N)	FWHM (10^{-3} cm^{-1})	Upper level ^a (cm^{-1})		Lower level ^a (cm^{-1})		Wavelength (nm)
25120.3269	.0085	0.76	71	118871	0	5p'	93751	397.9715
25315.8403	.0013	1.79	99	118460	1	5p'	93144	394.8979
25325.2989	.0034	1.17	96	118469	2	5p'	93144	394.7504
25668.9124	.0063	1.29	86	121069	1	6p	95400	389.4560
26070.4161	.0060	1.99	84	121470	0	6p	95400	383.4678
26515.0764	.0063	1.41	86	121069	1	6p	94554	377.0368
27085.9965	.0066	1.35	86	120230	3	4f	93144	369.0894
27318.1447	.0068	1.25	89	121069	1	6p	93751	365.9529
27390.7207	.0064	1.70	86	122791	0	6p'	95400	364.9832
27506.5746	.0165	0.52	109	121257	1	6p	93751	363.4459
27520.0268	.0064	1.56	83	121271	2	6p	93751	363.2682
27719.6402	.0091	0.72	95	121470	0	6p	93751	360.6522
27985.2236	.0068	1.33	95	123385	0	7p	95400	357.2295
28021.6135	.0064	1.96	86	121165	3	6p	93144	356.7655
28126.8637	.0062	0.95	109	121271	2	6p	93144	355.4305
29634.4517	.0075	1.15	87	123385	0	7p	93751	337.3482
30117.7873	.0077	1.12	95	123262	2	7p	93144	331.9342

^a The notation nl (e.g., $6p$) denotes levels of the $3p^5nl$ configuration with $3p^5(^2P_{3/2})$ core. The notation nl' (e.g., $6p'$) denotes levels of the $3p^5nl$ configuration with $3p^5(^2P_{1/2})$ core.

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5. References

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About the authors: Ward Whaling is Professor of Physics, Emeritus, at the California Institute of Technology. Bill Anderson and Mike Carle were Caltech undergraduate summer interns. J. W. Brault is retired from the National Solar Observatory where he developed the high resolution Fourier Transform Spectrometer used for this work. H. A. Zarem was an undergraduate student at University of California, Berkeley with an internship at Kitt Peak National Observatory.